



Drill Rig Electrical Systems and Safety Circuit: 1-1/2 hour

The program reviews typical electrical systems for both mechanical and electronic diesel engine driven drill rigs. Instruction is provided on how to read an electrical print. Details of how to troubleshoot electrical systems are provided. Additionally, the rig's safety circuit system and the typical safety shutdown parameters are reviewed to insure the rig is set-up for safe operation and specifically for the protection of personnel and major on-board equipment. A review of the latest electronic engine requirements for Tier III emissions and the impact of only electronic engines starting 2005 will be provided. Overview of ECM engine controls and the configuration and troubleshooting tools will provide insight as to maximizing engine performance.

Drill Rig Compressors and Controls: 2 to 3 hour*

The program reviews rotary screw compressor designs (single and 2 stage) and their application on air rotary and down-the-hole hammer drilling applications. Proper operation and availability of the compressor is critical in these applications. Proper up-hole velocity is critical to cleaning the hole of cuttings, while proper pressure and flow to the hammer is necessary for optimum hammer performance. The class reviews the details of the most common loading and unloading controls used by compressor manufacturers. Also included is a review of safety features such as high pressure safety relief, high temperature shut-down, and inter-stage pressure monitoring. Compressors have been a source of drill rig fires due to leaks, static charge, improper configuration, and poor maintenance. The class reviews in detail all of the components and configuration required, manufacturer's recommended maintenance requirements and troubleshooting procedures for compressors.

Hydraulic System: 1-1/2 to 2 hours*

The program provides an initial primer on the fundamentals of hydraulics. An introduction into "How to read a hydraulic diagram" provides insight into troubleshooting the more basic circuits. All drill rig functions that are hydraulically actuated are reviewed (rotation, slow & rapid feed, torque limiters, pumps, outriggers, wrenches, winches, etc). Specific application of hydraulic cylinders and motors are reviewed. Various pump designs (gear, vane, piston) with the primary applications they are used in is provided. Simple cylinder circuits i.e. outriggers, jib boom etc. are reviewed with the necessary components for safely completing the circuit. Load sense technology and its energy saving approach is reviewed. CMX valves used for high flow rotation and feed systems are covered. Special attention is given to proper maintenance and repair of hydraulic components to insure there is no contamination of the system. Contamination is the #1 cause of hydraulic function problems.

Drill Rig Maintenance 1-1/2 to 2 hours*

Summarizes the maintenance of primary drill rig equipment such as engines, compressors, mud pumps, various gearboxes as well as addresses chain and cable feed and winch system maintenance, cylinder and motor repair, rotation and pump drive gearbox maintenance, and other accessories. Recommendations for routine lubrication and maintenance, including recommended intervals is provided. Major overhauls both in terms of scope and life cycle is provided for each.

*** Time frame is adjustable. Scope can be modified to meet available time.**